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NATURAL DISASTER REDUCTION: EFFECTS OF DISASTERS ON MODERN SOCIETIES

Technical session

Addendum

Megacities: vulnerability of infrastructure to natural disasters

Summary of presentation by Mr. Stuart Mustow, President, Institute of Civil Engineers, and Representative of the World Federation of Engineering Organizations

1. Within the cycle of disaster management, the World Federation of Engineering Organizations (WFEO), and its London work centre at the Institution of Civil Engineers, consider that prevention is better than cure: that planning to minimize the effects of natural hazards is preferable to responding to the often disastrous effects of such hazards.

2. The logical conclusion of such an approach is that the process of disaster management becomes inextricably linked with strategic planning and development. A well-planned megacity is by definition one which has the capacity to withstand or at least diminish the impact of those natural hazards to which the city may be susceptible. The planning and condition of a city's built infrastructure is, we consider, a key factor.

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3. The rapid growth rate of the typical megacity is a significant factor in its development, often overwhelming the capacity of both the city's planning processes and existing infrastructure. Familiar urban characteristics of pressure on land and accommodation are exacerbated by unreliable and inadequate supplies of water, electricity and transport, and little or no public health provision. Preliminary studies conducted by the work centre show that much of the physical infrastructure of such cities would be vulnerable to major hazard, which would cause disruption of shelter, food, water and energy supply lines, movement, health care and, to a greater or lesser extent, create lasting damage within the national economy.

4. There are many examples of projects undertaken throughout the developing world, which are aimed at improving infrastructure, community facilities and the quality of life. It is our aim to ensure that such projects are also infused with awareness by national and regional authorities of the necessity of disaster mitigation, and knowledge of the principles to be applied.

5. Cost-effectiveness is a major consideration if the immense task of inner city slum-clearance and shanty town redevelopment is to be attempted. In these conditions, the appropriate technology may not be the most sophisticated or advanced; low-cost measures which build upon existing resources, skills and facilities could be the more feasible and sustainable solution. Public awareness, preparedness and education are areas in which the role of local community organizations and residents is pivotal.

6. A weak and ineffective organizational infrastructure will also exacerbate vulnerability. Legislative measures and administrative procedures for reducing risks are generally established and supported by an extensive foundation of knowledge and experience. Procedures are, however, worthless without properly resourced, planned and coordinated implementation by trained personnel.

7. Dissemination of information, education in its widest sense, communication and incentives are the means to encourage Governments, cities, communities, professionals and businesses to include disaster mitigation as part of their normal programming.

8. Finally, our studies highlight the absence of an independent source of information on mitigation to which government and cities can turn for advice. What is recommended is the establishment of an international body to coordinate mitigation measures, including the early completion of risk assessment for all megacities, as a precursor to comprehensive national assessments of the risks from natural hazards.

9. By studying these issues, WFEO and its work centre aim to produce a comprehensive practical methodology for assessing hazards, risks and the most cost-effective solutions for existing and emerging megacities, drawing together the roles of each level of government and of the relevant professional disciplines.

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NATURAL DISASTER REDUCTION: EFFECTS OF DISASTERS ON MODERN SOCIETIES

Technical session

Addendum

Application of satellite remote sensing for natural disaster reduction in developing countries

Summary of presentation by Mr. Niek Rengers, International Astronautical Federation/ International Institute for Aerospace

Survey

1. The presentation describes the integrated application of remote sensing and geo information systems in the process of monitoring and hazard assessment of natural disasters.

2. After a short introduction on the methodology of hazard assessment, emphasis is given to the unique role that satellite remote sensing can play in this context. An evaluation is made of the applicability of different types of remote sensing-imagery, considering their spatial, spectral and temporal resolution. Highlighted are the capabilities of the use of remote sensing data in geo information systems for data integration and analysis of hazard occurrence specifically for conditions in developing countries.

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Technical session

Addendum

Use of mobile satellite communications in natural disaster preparedness and emergency response

Summary of presentation by Mr. Eugene Staffa, Manager of Disaster, Emergency and Aid Communications, International Mobile Satellite Organization (INMARSAT)

1. The presentation deals with key technical and operational aspects of mobile satellite systems in natural disasters occurring in the densely populated, as well as rural and remote areas. Because mobile satellite communications (satcom) systems are independent of the local infrastructure, weather and other local conditions, they are used in all critical phases of disaster management: monitoring, warning, early intervention, emergency communications and ongoing support during reconstruction and rehabilitation.

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2. Mobile satcoms can be used in sudden or rapid impact disasters (e.g. earthquakes, hurricanes, tsunamis, floods) for the coordination of emergency work, ordering of supplies and sending of status reports, including still pictures and video for damage assessment. For example, mobile satcoms were used very effectively during the Mexico City and Los Angeles earthquakes. In slow onset disasters (e.g. drought in Africa), mobile satcoms are used for contact with field teams, interagency communications and media coverage, as well as for family and social calling.

3. The first mobile satcoms system, INMARSAT, began operations in 1982. It has since become the backbone of disaster and emergency communications throughout the world. INMARSAT is an intergovernmental organization with 72 member States, now serving over 34,000 users via national telecom entities. Among the biggest current users are major international emergency and relief organizations and United Nations agencies.

4. Mobile and portable satcoms are used for on-the-scene communications, as well as for direct connection to international switched networks. Mobile satcoms can significantly improve community emergency preparedness and thus decrease cost in terms of human life and property. Communities with available or pre-positioned mobile satcoms are better able to cope with diaster when it occurs, thus representing a lower insurance risk and a better chance for survival and restarting economic activity. Uninterruptable communications via mobile satcoms are invaluable for liaison with scientists. Monitoring and early warning systems incorporating INMARSAT land mobile, maritime or aero services and other satcoms are in various stages of planning and use. Terminals with activated sensors are available for monitoring of flood, wind or seismic variables and to provide early warning. High speed data services allow transmission of geoinformation systems data for a variety of disaster management or scientific purposes.

5. The continuous evolution of mobile satellite systems is providing users with ever smaller and more capable terminals. New systems based on satellites in a variety of orbits are in the planning or implementation stages.

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NATURAL DISASTER REDUCTION: EFFECTS OF DISASTERS ON MODERN SOCIETIES

Technical session

Addendum

Role of non-life insurance in disaster management systems

Summary of presention by Mr. Takashi Onoda, Chairman, The Marine and Fire Insurance Association of Japan

1. The world has recently witnessed many large-scale natural disasters. In Japan, frequent disasters, such as storm and flood damage caused by typhoons, earthquakes and eruptions, have become an extremely important managerial issue for non-life insurance companies. For example, typhoon "Mireille" (No. 19), which made its appearance in September 1991, caused 62 deaths by the accompanying storm and flood tide and damaged 700,000 houses, incurring a total loss of ¥600 billion (or about US$ 4.5 billion in 1991) to the insurance industry. Also, in July 1993, an earthquake off the south-west shore of Hokkaido proved to be another major calamity in which more than 230 people were found dead or missing in the wake of large tidal waves and many fires.

2. Where the role of non-life insurance is considered from the standpoint of natural disaster risk management, the following problems and issues are noted:

(a) As with the insurance industries of other countries, the Japanese insurance industry has made great efforts to enhance coverage for storm, flood and earthquake insurance to better meet the needs of policy holders. These changes, however, together with the frequent occurrence of natural disasters, have rapidly increased the amount of payment for losses. Compared with other types of losses, it is extremely difficult to calculate the premium rates of natural disaster insurance. The common problem among insurance companies

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throughout the world is how to maintain the appropriate balance between coverages and premium rates for natural disaster insurance;

(b) In the aftermath of typhoon "Mireille" in 1991 and hurricane "Andrew" in 1992, many insurance and reinsurance companies went bankrupt or stopped underwritings, causing the world reinsurance market to face an unprecedented shortage of reinsurance underwriting capacity. While this conservative tendency in the market is becoming more relaxed, the premium rates remain at high levels;

(c) Being prepared for catastrophic natural disasters, the Japanese non-life insurance companies have a special system called catastrophic loss reserves. For example, when paying for the losses of typhoon "Mireille", the Japanese non-life insurance industry as a whole transferred ¥290 billion, or over US$ 2 billion, from that reserve, keeping the year's operational losses to the minimum;

(d) The Japanese non-life insurance industry is conducting fundamental studies and research concerning the risks of various disasters. Regarding natural disasters, it is researching typhoon damage, the effect of global warning on disasters and problems concerning acid rain.

3. Preceding and taking into account the problems encountered in the area of non-life insurance as regards natural disasters, the following three proposals are made:

(a) Stabilization of the reinsurance market and establishment or upgrading of government reinsurance systems;

(b) Establishment of catastrophic loss reserve systems;

(c) Mutual exchange of information on disasters.

4. Although we cannot avoid natural disasters, we should do our utmost to decrease the extent of losses by disasters. From here on, let us continue our best efforts to realize a safer world for the twenty-first century through mutual cooperation among Governments, industries and academic sectors of all countries.